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EMERGENCY MEDICINE

EDITORIAL

GUEST EDITORIAL — *P. A. Kopplin, M.D.* 73

ARTICLES

Burns: Initial Management — *M. Treloar, B.Sc.* 75

Emergency Management of Dehydration in Infancy — *M. L. Greenberg, M.D.*, *C. J. L. Newth, M.D.* 80

Psychiatric Emergencies: The Crisis Intervention Approach — *G. Voineskos, M.D.* 85

Acute Drug Poisoning — *C. D. Tamblyn, M.D.* 90

Grand Round Quiz — *I. Feferman, M.D.* 92

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Guest Editorial

DR. PETER A. KOPPLIN received his M.D. from the University of Toronto and is a fellow of the Royal College of Physicians and Surgeons of Canada. He is a post-doctoral fellow of the Yale School of Epidemiology and Public Health in Medical Care. Dr. Kopplin is currently Assistant Professor in the Department of Medicine, an Associate of the Department of Behavioural Science at the University of Toronto, and Director of Ambulatory Services at St. Michael's Hospital, Toronto.

The first taste of emergency medicine for the medical student occurs in the emergency departments of the bigger city hospitals. From his first role as a timid observer during the Behavioural Science course, the educational process leads him to the front-line as a practitioner in his interneship.

Television writers have realized that apart from the operating room there is no other area in the hospital which is suspended in twenty-four hours of drama. It is a stage for the whole range of human feelings — red hot anger, consuming pain, aggravating frustration, black grief, dogged bravery, joy and human comfort.

The public inebriate is the archetypal patient in the downtown hospitals. Tremendously vulnerable to serious medical and surgical illnesses, he is a frequent visitor to the Emergency scenario. Recognizing that there is a role expected of him, he is boisterous, brawling, and uncooperative. It is an interesting social phenomenon that in a different setting his behaviour, even when drunk, may be quite different and even subdued. But, in his role as the Fool, he tells us a good deal.

He argues about the long delays waiting for care. He bellows at insensitive behaviour. He stubbornly refuses x-rays and tests or demands others. It is interesting that most Emergency department studies list these grievances as problems. The long waits .the cold treatment and the excessive technical exercises are complaints frequently voiced by students of the medical care process.

Added to these failings is the difficulty of coping with the non-urgent patients. Some experts have suggested that this should not be viewed as a problem and that emergency departments should be organized as medical drop-in centres. This ignores a very vital feature of any good emergency department. There is an emotional and intellectual set, which can turn on a cascade of crisp, logical activity when the desperately sick or injured present themselves. To bring the non-urgent patient into this setting is to dilute excellent emergency care with overtreatment, resentment, and appalling follow-up care for the non-urgent[1].

It has been shown that previous contact with a family physician leads to a much higher number of "true emergencies" reaching the Emergency Department[2]. In one under-serviced area the establishment of a neighbourhood health centre reduced the non-urgent load of patients coming to the Emergency. The encouragement of this kind of continuity with a primary physician appears to be a worthwhile medical care goal.

Despite its problems, the Emergency Department continues to have an enormous impact on the education of physicians. Compressed into a relatively short span, the interne is exposed to a wide variety

of medical problems necessitating judgement and decision. A gradual sense of independence develops. The cooperative effort of various health professionals in tense situations renders team medicine a reality rather than a cliché.

In the future one can anticipate a growing lay involvement in the Emergency rooms. Good experiences have grown up in Toronto with members of Alcoholics Anonymous assisting alcoholics, and attached youth workers aiding in drug problems. The Women's Movement is now proposing similar involvement in rape cases. Such involvement can only be helpful in teaching students the community's role.

Finally there is a gradual acquisition of composure by the young physician. The gains may be meagre at first, but sewing a simple laceration, drinking black coffee at 3 a.m., taking a history from a recent immigrant, seeing the extremes of human behaviour, or facing death and tragedy in its naked immediacy, are refining fire, and indelibly burn their memories on the future physician.

P. A. Kopplin, M.D.

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Burns: Initial Management

Murray Treloar, B.Sc., 7T5

Burns may vary from minor first-degree wounds to the most severe form of injury to which man is liable. This article will discuss the emergency care of any burn, the recognition of burns which require specialized care and the management of minor burns on an out-patient basis. There will be a brief account of the definitive treatment rendered patients with major burns.

Burns may be caused by thermal, chemical or electrical injury. The response to injury may be local or may involve extensive physiological changes, dependent upon the amount of body surface area burned, the depth and cause of the injury, the anatomical location, and the age and previous health of the patient.

INCIDENCE, MORTALITY AND CAUSE

Each year about 7.5 people per 1000 sustain burn injuries. In adults the injury is seldom fatal. In children, however, burns lead the causes of accidental death under the age of 3 and remain in second place to age 14.

Of all burns, one-third occur in children at home and most are preventable. Up to 3 years of age, most burns are due to scalds. In those from 3 to 14 years, flame burns due to clothing catching fire predominate. In persons from 15 to 60 years, industrial accidents are common causes, and in those over 60 years, accidents associated with smoking in bed and houses catching fire are the usual causes.

FIRST AID

First aid is the care provided at the scene of the accident, usually by a non-medical person. Its principles should be familiar to everyone.

A person whose clothes are on fire should not remain standing since an upright position may result in flame inhalation or in ignition of scalp hair. He should be placed horizontally and then rolled in a blanket, rug, coat or other garment to smother the flames. A person suffering respiratory arrest due to smoke inhalation should receive mouth to mouth artificial respiration.

After burning clothing has been extinguished and breathing is satisfactory, the initial care of the patient is to cover the wound. The burned part may be immersed in cold water or covered with towels soaked with ice-water. This will minimize airborne contamination, cool the burned tissue and provide some relief of pain. No ointment or grease should be applied at this time. Constricting clothing should be released, and if the hands are burned, rings should be removed. Severely burned patients (second or third-degree of greater than 15% body surface area in children, or 20% in adults) should not be allowed to drink large volumes of fluid, because of the dangers of water intoxication and of vomiting and aspiration.

Chemical burns caused by acid or alkali should be washed immediately with large quantities of water to remove the injurious agent.

Even the severely burned patient remains in good condition for some time after the accident. For this reason it is unnecessary to rush from accident to hospital; greater injury may result from exceeding the speed limit than from the few minutes otherwise lost.

EMERGENCY MEDICAL CARE

The physician usually first sees the patient in the hospital emergency room. Initially he should determine that respiratory distress, shock and gross dehydration are not present. Then in severe injuries, he should proceed to draw blood for baseline laboratory determinations, administer fluids intravenously, and install a urinary catheter and measure output. After these urgent aspects of care are complete, a history and physical examination are in order. Less severe injuries may be cleansed, debrided, dressed and sent home, or admitted locally. Each of these decisions and manoevres will be discussed in more detail in the paragraphs which follow.

The History

After the urgent aspects of care, a thorough history is important. The time and cause of the burn, the first aid treatment and the previous health status of the patient are significant historical data.

The time elapsed since burning is useful for estimating the patient's fluid loss and for predicting the onset of certain complications. The cause of the accident is often the best way to judge intelligently what depth most of the burn is likely to be. Hot water spill scalds rarely produce subdermal burns, except in infants; but prolonged immersion in hot water frequently results in subdermal burns. Burns of the inner surface of the lips, from accidental ingestion of very hot liquids, are almost never subdermal. However, any burn caused by flame, including flaming mattresses, clothing and gasoline, will be subdermal over a significant portion of the burned area. Asphalt burns, despite their grim appearance, tend to be superficial.

Electrical burns are like icebergs: *most* of the injury can be assumed to lie in the subdermal tissue adjacent to the points of current entry and exit. This is unlike thermal burns of the skin, where the layers closest to the heat source are the most severely injured. Electrical burns of the mouth are seen in toddlers who have chewed on an electrical cord. Such an injury resembles a thermal more than an electrical burn. The injury is produced by a current arc rather than by transmission of electricity through body tissues; less deep necrosis results.

Corrosive burns commonly affect the lips, mouth and esophagus. Alkali (lye, oven cleaner, drain cleaner)

produces a liquefaction necrosis extending deeply into exposed tissues. Acid corrosives (household bleach) produce a coagulation necrosis which impedes deep penetration and rarely results in permanent damage.

The most common first aid administered is probably immersion in cold water. This is a good manoevre provided that the water is clean. However, immersion in lake water, for instance, could inoculate the wound with pathogenic bacteria. Documentation in the history of such a first aid measure might assist treatment of wound sepsis or explain early demise of the patient.

The previous health of the patient is also important. For example, in children, a history of recurrent infections might lead to discovery of immunoglobulin deficiency. In adults, a history of vascular insufficiency in a burned extremity will presage poor wound healing. Thus the physician needs to be aware of pre-existing cardiovascular, respiratory, renal or metabolic disease, including diabetes, peptic ulcer, alcoholism and TB. Other important historical information includes previous active immunization to tetanus and allergy to antibiotics and other drugs.

The Physical Examination

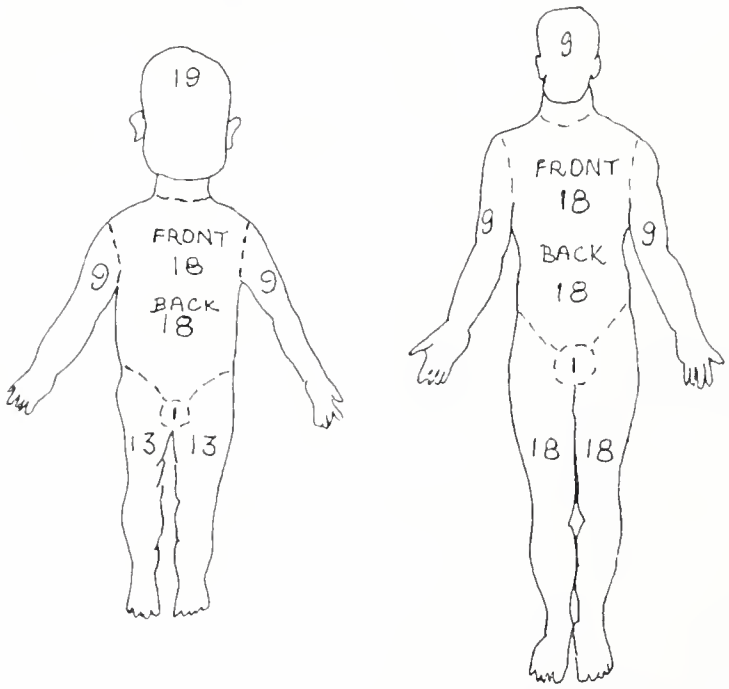
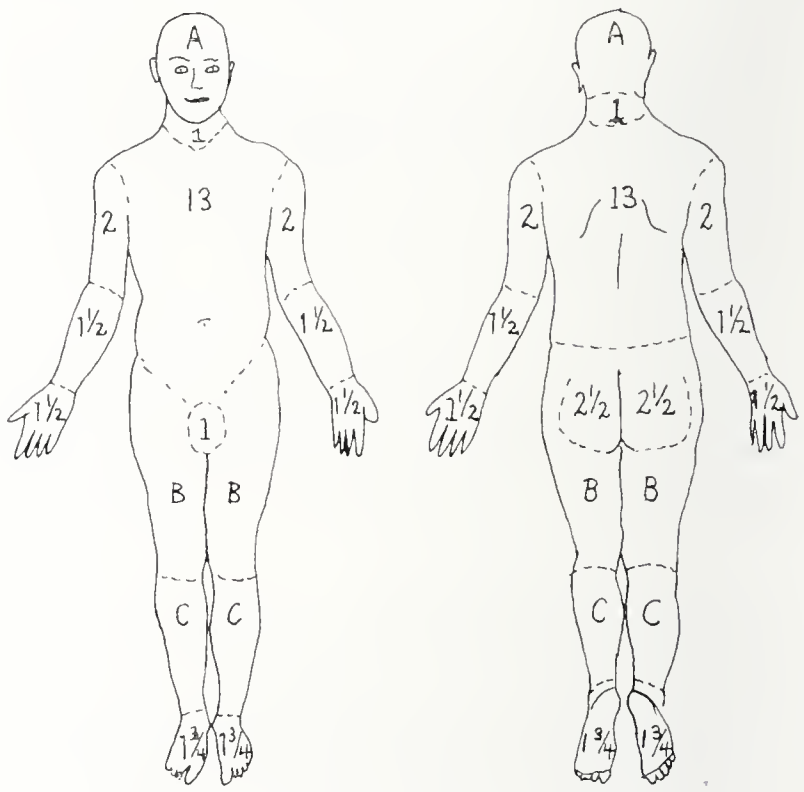


FIGURE 1 – Schematic outline of the Rule of Nines used to calculate the area of involvement expressed as a percentage of body surface area.

Left: figure representing a 1-year-old child.

Right: figure representing an adult or a 10-year-old child. For each year of age from 1 to 10, one percent is subtracted from the head and ½ percent is added to each lower extremity.

The prognosis of the thermally-injured patient is primarily determined by the extent of his injury, that is the percentage of body surface area involved by second and third degree burns. The "Rule of Nines" is a rapid and sufficiently accurate method for determination of extent (Fig. 1). It is modified in children from birth to one year of age such that 19% is allowed for the head and neck and 13% for each lower extremity. One per cent is subtracted from the head and neck and ½% is added to each lower extremity for each year from ages 1 to 10. A more precise estimate of burn area can be made by use of a Lund and Browder chart (Fig. 2). In either method, only second and third-degree burn areas are included in the estimated percentage of body area burned.



RELATIVE PERCENTAGE OF AREAS AFFECTED BY AGE

	Age in Years					
	0	1	5	10	15	Adult
A – ½ of Head	9½	8½	6½	5½	4½	3½
B – ½ of Thigh	2¾	3¼	4	4¼	4½	4¾
C – ½ of Leg	2½	2½	2¾	3	3¼	3½

FIGURE 2 – Lund and Browder charts. These charts permit a rather accurate method for determining percentage of body surface involved.

In addition to extent of burn, depth is also determined on examination. Five gradations of burn depth are distinguished by most authors (Table 1 and Fig. 3). Table 1 shows that, parallel to the classical first, second and third-degree designation, there is a terminology which describes burn depth explicitly and for this reason is probably preferable. In addition, an injury which does not destroy completely the epidermal and dermal layers is termed partial-thickness, while more complete destruction constitutes a full-thickness injury.

TABLE 1
VARIOUS DEPTHS OF BURN INJURY

Classical Term	*Descriptive Term*	
First-Degree	Superficial	Partial-Thickness
Superficial Second-Degree	Superficial Dermal	Partial-Thickness
Deep Second-Degree	Deep Dermal	Partial-Thickness
Superficial Third-Degree	Superficial Subdermal	Full-Thickness
Deep Third-Degree	Deep Subdermal	Full-Thickness

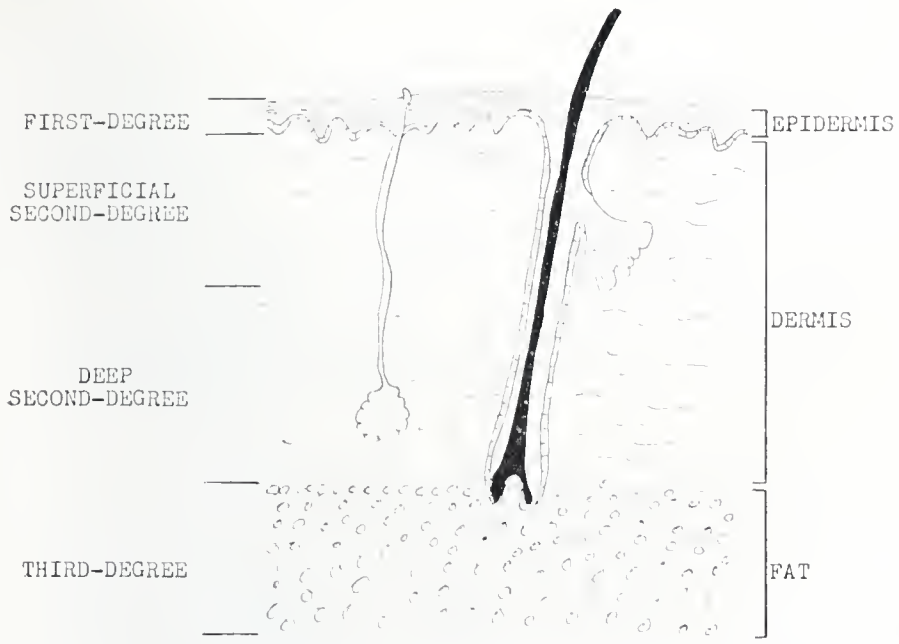


FIGURE 3 – Schematic outline of cross section of skin.

Except for superficial burns and deep subdermal burns, the clinical assessment of burn depth is often a difficult task. The physician's first estimate is based on the appearance of the wound a few hours after the injury and as well, on knowledge from the history of what caused the burn and of how long the patient was exposed. In later assessments, the physician who is then caring for the patient will observe the progress of wound re-epithelialization. On the basis of this observation he will confirm or revise the initial estimate of depth.

The process of assessing burn depth and the associated parameters are indicated in the accompanying chart (Table 2). Estimates of depth are useful both initially and as healing progresses for predicting whether spontaneous closure will occur and for predicting the likelihood and the consequences of serious wound infection. For example, a superficial dermal burn should heal spontaneously in 14-21 days with low risk of infection and if infection occurs, it will not immediately result in conversion of the wound to a full-thickness loss requiring grafts for closure. By contrast, a deep dermal burn will take longer to heal, will more likely become infected and if infected, will rapidly convert to a full-thickness skin loss.

Respiratory distress may result from a variety of causes. Upper airway obstruction from edema of mouth, nose, pharynx or larynx, inability to handle secretions, chest wall injuries and certain inhalation injuries are the usual etiologies. Respiratory distress may be manifested clinically as cough, hoarseness, stridor, rapid respirations or cyanosis. A history of the patient being burned in a closed space, the appearance of redness in the posterior pharynx, rales in the chest or asthma-like wheezing should alert the physician to the possibility of respiratory system damage. Patients who have been burned in a closed space or who have facial burns must be watched especially closely during the initial 48 hours post-burn for the late development of respiratory complications.

The treatment of a patient in respiratory distress is to provide humid, oxygenated air by mask or by oropharyngeal or nasal airway tube. In addition corticosteroids, antibiotics and assisted respiration are considered. Tracheostomy is the last procedure considered, and is very seldom indicated.

The discussion of the physical examination so far has mentioned areas of assessment relating specifically

TABLE 2 — CHARACTERISTICS OF VARIOUS DEPTHS OF BURN INJURY

Depth of Burn	*Causes*	*Surface*	*Pain*	*Healing*
First-Degree	Sunburn Brief Scald Minor Flash	Erythema Dry, No Blisters Mild Edema, if at all	Painful	Pain and burning sensation subside after 48 hours. Infection is not a risk. Within 5 to 10 days the epidermis peels off in small scales. There may be residual redness for a few days but no scarring results.
Superficial Second-Degree	Major Flash Scald Periphery of Flame Burns	Moist, Blisters Considerable Edema Mottled Red with with some White	Painful	Healing occurs uneventfully in 14-21 days unless infection supervenes. No scarring.
Deep Second-Degree		Moist, Blisters but both less than Superficial Second-Degrec Mottled White with some Red	Painful, but less so*	Easily converted to third-degree by infection. Epithelialization beginning after 25-35 days if aseptic. Thick scarring.
Superficial Third-Degree	Flame Contact with Hot Cbject Electric	Dry, No Blisters Edema > Second-Degree Burn White or Brown Feels Leathery	Painless*	Three stages: Drying, Separation of eschar (2-3 weeks), Granulation. Coverage by skin grafts is necessary.
Dcep	Electric Severe Flame Burns	Charred, Sunken, Hard	Painless*	Three-stage process as above. Systemic derangement is greater than for superficial third-degree because fat, muscle and bone burned.

** Pain sensation may be tested by pin prick (sterile needle) or by gently pulling on a hair.*

to the burn injury. In the more general assessment of the patient it is important to note that even extensive thermal injuries do not result in immediate physiological deterioration. Therefore if a patient has been burned only a short time previously (4-6 hours), yet is disoriented or shows other mental aberration, you should suspect an associated head injury, acute alcoholism, diabetic precoma or drug overdosage due to repeatedly administered narcotic analgesics. The patient's state of hydration should also be estimated. In this regard the parameters to evaluate are thirst, eye and skin turgor, mucous membrane moisture and urine volume. Hemoglobinuria may be noted in very large burns, and is an indication that the patient may later require blood transfusion.

In summary, from the point of view of emergency care, it is important to recognize the severely burned patient and to begin intravenous fluid replacement and assure adequate oxygenation. In the patient's history, it is important to detect pre-existent disease, and to know the patient's age and previous physical condition. In the physical examination one should be alert for possible respiratory system damage, for injuries accompanying the burn and for inadequate hydration. The extent and depth of burn should be evaluated.

A factor which has not been discussed is the anatomical location of the burn. Burns of the hands, feet, face or perineum are considered more serious than the percentage of body area burned would indicate. This is because any scarring which occurs in these areas may be severely disabling and/or disfiguring. All second and third-degree burns of these areas should be hospitalized and receive care from a specialist in this field.

TRIAGE AND TREATMENT

The management of a burn wound clearly involves a very early assessment of its severity. Decisions in the management of the patient are aided by some classification of severity. Such a classification should take into consideration the many factors mentioned above; Table 3 is an example in this regard.

TABLE 3
A CLASSIFICATION OF BURN WOUND SEVERITY

	Severity		
	Minor	**Moderate**	**Severe**
Depth & Extent	Most 1° Burns	—	—
	2° of <15%	2° of 15-30%	2° of >30% 2° of Hands, Feet, Face or Perineum
	3° of <2%	3° of <10%	3° of >10% 3° of Hands, Feet, Face or Perineum
Location	Hands, Feet, Face or Perineum Not Involved		
Age	Not less than 18 mos. nor greater than 65 yrs.		Any patient less than 18 mos. or greater than 65 yrs.
Complicating Illness	None	None	Cardiac, Respiratory, Renal, Metabolic or Traumatic
Disposition	OPD	Community Hospital	Regional Hospital

Treatment of Minor Burns

Burns of minor severity can be treated adequately on an outpatient basis. It bears repeating that one must beware of the minor burn with respiratory tract damage. Even when the surface injury is small, the patient must be hospitalized if there is suspicion of smoke inhalation damage. Similarly minor burns involving the hands, feet, face or perineum should be hospitalized and receive specialist care.

If the patient is agitated and in pain, as often happens, an injection of codeine or other analgesic should be given.

The wound should be cleansed and debrided, and an occlusive dressing applied. Cleansing the wound can be accomplished with soap, water and gauze squares. Antiseptics are to be avoided. It is best to trim away blisters (the blister fluid is a good bacterial culture medium) and loose skin. However, minor burns of the hand that involve thick, sturdy blisters, especially on the palm, do better when blister is left unruptured.

A dressing should occlude the wound, splint the part, be easily removed, be comfortable and be absorptive. A simple and satisfactory dressing can be made of sterile plain or vaselinized gauze squares, to the thickness of a half inch, held firmly in place by Kling elasticized gauze and reinforced by tape. The dressing should be thick enough that it does not soak through from the wound and firm enough that it does not slip. As a general rule, dressings should be changed every four days until healing is complete.

Precautionary antibiotics are not necessary unless the wounds appear to have been contaminated initially. The patient is instructed in the signs of infection (fever, extreme pain or swelling, foul odor) and told to return to hospital if these signs appear. Should the burn become infected (excessive drainage, friable and easy to bleed, malodorous and surrounded by erythema and edema), a swab for culture should be taken and systemic antibiotics prescribed according to the results of in vitro sensitivity tests. While the bacteriological studies are in progress, tetracycline or ampicillin can be used.

Sunburn is almost always superficial and healing will accur in 2 to 4 days at home. Spray anaesthetics give symptomatic relief during this time.

Treatment of Moderate and Severe Burns

Second and third-degree burns of greater than 15% in children and greater than 20% in adults require immediate fluid replacement therapy. Blood is drawn for electrolytes, BUN, hemoglobin, crossmatching and, if there is any question of inhalation injury, blood gases. Intravenous saline or lactated Ringer's solution is then started. The adequacy of fluid replacement is monitored by catheterizing the bladder and measuring urine output.

These 3 urgent steps in emergency care are directed towards prevention of burn shock. Burn shock is characterized by a sharp drop in intravascular volume, decreased cardiac output, increased blood viscosity and decreased glomerular filtration rate. These changes are caused chiefly by a sudden increase in capillary permeability localized to the region of the wound if less than 30% of the body area is burned, and generalized in all body tissues if the wound involves a greater area. As much as 50% of the plasma volume may be lost to the interstitial space in the first 2 hours post-burn. Reversion to normal ordinarily is complete by 48 hours post-burn.

The next step in management may be transportation of the patient to a more specialized hospital facility. The physician rendering emergency care is also responsible for looking after the patient during transportation. Intravenous fluids are continued and the respiratory status of the patient is watched closely during transport.

The following account of the definitive treatment of the patient is an outline of the procedure followed at the Hospital for Sick Children. Swabs for bacterial culture and sensitivity are made of the burned areas, of the nose and throat, of the perineum and of unburned skin. The wound is then cleansed and debrided of debris and loose blisters. A sterile environment for the wound is then strived for by the application of a topical antibiotic barrier, by reverse-isolation of the patient and by a 3-4 day course of systemic penicillin. This brief systemic course of penicillin reduces streptococcal wound sepsis and after it is completed, systemic antibiotics are given only if a specific indication arises.

The patient receives no food for the initial 2-3 days and thereafter, he receives a high-protein diet. The burn surface is managed by continued application of a topical antibiotic. Separation of the eschar is encouraged by frequent dressing changes and baths. If the burn is localized, the eschar may be excised before natural separation has occurred and grafts applied to the area. More generalized burns are allowed to separate on their own and then are covered by hetero (xeno) grafts or homo (allo) grafts, to be followed later by auto grafts.

Finally, precautionary treatment against tetanus is mandatory in deep dermal and subdermal burns, but optional in more superficial injuries.

Chemical and electrical burns, and frostbite, a burn-like injury, should be mentioned in this article. A brief but complete discussion of these topics is available in Sabiston*.

ACKNOWLEDGEMENT

I would like to sincerely thank Dr. J. R. Birch, of the Hospital for Sick Children, and Margaret, my wife, for their help in preparing this article.

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INDEX TO ADVERTISERS

UNIVERSITY OF TORONTO TEXTBOOK STORE 74
WHITE CROSS SURGICAL SUPPLIES 84
A&A BOOKSTORE 84
CANADIAN ARMED FORCES ..... Outside Back Cover

Emergency Management of Dehydration in Infancy

Mark L. Greenberg, M.D. &*
*Christopher J. L. Newth, M.D.**

INTRODUCTION

One of the most catastrophic events that can affect an infant is a major alteration in body fluid composition. While the management of dehydration is relatively simple in most instances, initial handling of some cases may make a critical difference. We have been struck by the improvement in outcome when prompt and appropriate therapy is instituted by the contact physician prior to transfer to our hospital. This difference has been noted especially when prolonged transportation would otherwise have resulted in significant deterioration.

The assessment of hydration in the infant requires skill and experience. It may be difficult both to begin and maintain intravenous therapy and to obtain blood for laboratory studies. However, the benefit that may accrue to the infant if the contact physician makes this effort renders the effort worthwhile. The following is a simple scheme for the assessment of the dehydrated child and the initial therapeutic manoeuvres required. It is important that whatever steps are taken be communicated both to the transporting staff and to the receiving physician.

Dehydration occurs when there is a net deficit of body water. This is inevitably accompanied by a deficit of electrolyte. If the electrolyte and water losses are equal, the tonicity of the extracellular fluid remains unchanged. If the loss of electrolyte is greater than the loss of water, the extracellular fluid will be rendered hypotonic, resulting in the shift of fluid from the extracellular fluid compartment. Thus, in both of these situations, the major loss of fluid is from the extracellular compartment, including the intravascular space.

If, on the other hand, water is lost in excess of electrolyte, the extracellular fluid is rendered hypertonic, resulting in a shift of fluid from the intracellular to the extracellular compartment. The major loss is thus from the intracellular, rather than the extracellular compartment.

Since the clinical signs and symptoms of dehydration depend largely on the volume of the extracellular fluid compartment, it is obvious that if this compartment is maintained at the cost of the intracellular compartment, these signs and symptoms will be masked, as exemplified above. This is referred to as hypertonic (hypernatremic) dehydration, and will be discussed separately.

The vast majority of cases of dehydration in infants are isotonic or hypotonic, and result from a primary process causing excessive loss of body fluids, with a secondary diminution of intake, due to anorexia. The excessive loss is most frequently from the gastrointestinal tract, but may be from the urinary tract. This is complicated in infants by the large body surface area, relative to size, from which significant fluid loss occurs. This is accentuated in the febrile child. In addition, the febrile child usually hyperventilates, further increasing fluid loss.

The loss of bicarbonate ions in the stool, the accumulation of the acidic metabolites secondary to poor peripheral perfusion, the production of keto acids caused by starvation, and often the administration of salicylates combine to produce metabolic acidosis, which may be modified slightly by the loss of acid due to vomiting. The child with significant dehydration is thus most often acidotic.

GUIDELINES FOR THE ASSESSMENT OF DEHYDRATION

While it is intended to present both clinical and laboratory criteria for assessment it must be understood that clinical assessment alone is adequate to permit initiation of therapy, and therapy should never be delayed because of the lack of laboratory facilities.

The assessment and therapy of the dehydrated infant may be considered under the following four major categories:

1. Volume deficit
2. Electrolyte alteration
3. Acid-base disturbance
4. Associated metabolic alterations

These are summarized in Table I.

1. Volume deficit

(a) *Clinical*: Only a crude estimate can be made clinically, and it is usual to put the infant into the broad categories of dehydration expressed as a percentage of body weights namely 5%, 10% or 15% and greater. For all categories it is important to attempt an estimate of fluid loss from the history. Accurately documented weight loss over the appropriate time period, while rarely obtainable, is of inestimable value. Fat children are notoriously difficult to assess and their degree of dehydration is usually underestimated. Rough correlates with the degree of hydration are:-

5% –	dry mucous membranes
10% – 5%	lack of tears
	oliguria
	depressed fontanelle
	decreased skin turgor
	sunken eyes
	tachycardia

* *The Hospital for Sick Children, Toronto, Ontario*

TABLE I

	Clinical Assessment	*Laboratory aids*	*Therapy*	*Parameters to follow*
1. Volume deficit	mucous membranes skin turgor urine output tears peripheral perfusion heart rate blood pressure weight	urine SG BUN Haematocrit	deficit fluid + maintenance fluid + ongoing loss	BP and pulse urine output Perfusion
2. Electrolyte Alteration	skin consistency (doughy)	serum electrolytes	slow replacement	serum electrolytes
3. Acid base problems	Tachypnea (Kussmaul) cold mottled skin smell of acetone	venous gases urine pH urine for sugar and acetone	$NaHCO_3$ 1 meq/Kgm IV push and 1 meq/Kgm in pedatrol	Respiratory pattern Perfusion
4. Associated metabolic Alterations				
(a) Hyperglycemia	Disproportionate disturbance of consciousness	blood sugar	nil	blood sugar
(b) Hypoglycemia	jitteriness seizures	blood sugar	50% Dextrose 2 cc/Kgm IV push	blood sugar
(c) Hypocalcemia	jitteriness seizure tetany stridor	serum calcium	10% calcium gluconate 10 cc in 40 basic fluid over 2 hours	serum calcium

15% – 10% decreased blood pressure
anuria
poor peripheral perfusion
altered state of consciousness
SHOCK

(b) *Laboratory Aids*:

i. Urine specific gravity greater than 1.025 – this is an early compensatory mechanism.

ii. Elevated haematocrit
iii. Elevated BUN

} usually significant only when dehydration is approaching 10%.

2. Electrolyte Alteration

(a) *Clinical* – For all practical purposes, the only important sign is that of "doughy" skin, which occurs in hypertonic dehydration – see later.

– Convulsions, if present, are rarely due to hyponatremia and are usually caused by the underlying disease, hypernatremia or associated metabolic disorders.

(b) *Laboratory Aids* – Direct measurement of serum sodium, potassium, and chloride, and indirect measurement of the bicarbonate.

The important situation to exclude is an elevated serum sodium which will be associated with hypertonic dehydration.

3. Acid-base Disturbance

(a) *Clinical:*

i. Kussmaul breathing
ii. Blotchy skin
iii. Acetone smell on breath

} all denote acidosis. While the most common cause of this triad in infancy is undoubtedly dehydration secondary to gastroenteritis, the same clinical picture may also be caused by salicylism and diabetic acetoacidosis.

It is impossible to make a clinical diagnosis of alkalosis although it may be suspected if there is an appropriate history of excessive vomiting.

(b) *Laboratory Aids:*

i. Blood gases, if available, are extremely useful. It is not necessary to obtain arterial blood – a venous sample will supply accurate information on the pH and pCO_2 which are the relevant parameters in the clinical situation under discussion.

ii. Glycosuria and ketonuria *may* be an indication of diabetic ketoacidosis.

4. Associated metabolic alterations

i. Hyperglycaemia

a) Clinical – there are usually no signs or symptoms.

b) Laboratory – elevated blood sugar and glycosuria

ii. Hypoglycaemia

a) Clinical – alteration of consciousness
twitching
cold, dry skin
coma and convulsions
or NONE

Two clinical situations in which hypoglycaemia is particularly common are prolonged diarrhea in a small infant, and hypoadrenalism.

b) Laboratory Aids – blood sugar less than 40 mg%.

If this finding is associated with an elevated serum potassium (in a non-haemolysed blood specimen) the possibility of adrenal insufficiency must be considered.

iii. Hypocalcaemia

a) Clinical – Stridor
Tetany
Convulsions
Chvostek's or Trousseau's signs

b) Laboratory Aids – decreased serum calcium.

GUIDELINES FOR THERAPY

There are two cardinal rules:-

A. Start replacement in terms of fluid quantity and electrolyte content before transfer to referral hospital.

B. Ensure that the Ambulance team know the infant's requirements for IV fluid and electrolyte for the duration of the transfer trip, and that details of therapy given for the acute resuscitation (if any) and transfer are communicated to the physicians at the referral hospital.

1. Volume deficit

(a) a *shocked* child requires immediate volume expansion with isotonic fluid irrespective of the state of the serum electrolytes. Normal saline or plasma may be used in the amount of *20 ml/Kg over ½ - 1 hr.* Even in a 15% dehydrated infant, this volume should restore the intravascular compartment with consequent rise of B.P. and perfusion of the kidneys.

(b) in the less seriously affected infant, a more leisurely volume repletion may be undertaken, consideration being given to the following:-

i. Replacement fluid [calculated on basis *either* of known weight loss (1 ml = 1 gm.) *or* of estimated degree of dehydration.]

PLUS

ii. Maintenance fluid.

The following table gives appropriate volumes for body weight, for each 24 hours.

First 10 Kg. body weight = 100 ml/Kg/day
Second 10 Kg. body weight = 50 ml/Kg/day
Each subsequent Kg. body weight = 20 ml/Kg/day

PLUS

iii. Ongoing losses – e.g. diarrhoea, vomiting. By and large, these will not need to be considered in the initial calculations. It should be impressed upon the Ambulance team that any such losses during the trip must be recorded as accurately as possible under the circumstances, and the information passed on to the receiving physician. If the child is not referred, the managing physician should remember to replace measured loss, volume for volume. When the figure for the 24 hr. volume replacement has been calculated, from the above, arrange to give half in the first 8 hours (which will cover the time of most transfer journeys) and the remainder over the next 16 hours.

2. Electrolyte Alteration

(a) Shocked child – volume expansion with isotonic fluid, such as normal saline or plasma: while this increases the total electrolyte load, it will not alter the tonicity.

(b) For the less seriously ill patient or after the initial resuscitation use a hypotonic fluid such as 3.3% dextrose in 0.3% saline (2/3 / 1/3) or 0.2 N saline plus 5% dextrose. This will prevent an excess of electrolyte being given.

3. Acid-base Disturbance

If the child is clinically acidotic, and no blood gases are available give: 1 ml/Kg body weight of 7.5% Sodium bicarbonate IV push and 1 ml/Kg body weight of 7.5% Sodium bicarbonate in the IV solution and run in over half an hour. If blood gases are available, correct acidosis as above, *only if pH less than* 7.20.

4. Associated Metabolic Alterations

i. Hyperglycaemia – the finding of an elevated blood sugar is not uncommon in many Paediatric situations. Unless the blood sugar is greater than 650 mg% or there is a clear clinical history consistent with Diabetes mellitus (which is uncommon) give NO INSULIN.

If a decision to give Insulin has been made, an appro-

priate dose would be ¼ I.U./Kg. body weight of Regular (Toronto) Insulin, subcutaneously.

ii. Hypoglycaemia – this is a dangerous finding and must be treated promptly with 2 mls 50% Dextrose/Kg. body weight, IV push. The importance of this finding must not be underestimated in terms of the differential diagnosis and continuing therapy. It *must* be communicated to the receiving physician.

iii. Hypocalcaemia – do not treat unless the patient is symptomatic, or the serum calcium is less than 6.0 mg%. Give 10 mls of 10% calcium gluconate diluted in at least 40 mls of basic fluid over 2 hours.

To summarize the guidelines for therapy of hypotonic and isotonic dehydration:-

1. treat shock first
2. Then calculate appropriate fluid for a 24 hour correction and administer at a rate which gives half the volume over the first 8 hours.
3. Treat acidosis
4. Be aware of the likely associated metabolic abnormalities and treat if necessary.
5. COMMUNICATE

HYPERNATREMIC (HYPERTONIC) DEHYDRATION

This condition, while relatively uncommon, poses the gravest threat to the infant. The morbidity and mortality for this type of dehydration are considerably greater than for the hypo and isotonic forms, and this is further compounded by the difficulty in making the diagnosis and in assessing the severity of the dehydration.

As was previously pointed out, hypernatremic dehydration ensues when water loss exceeds that of electrolyte. The loss of hypotonic fluid renders the remaining extracellular fluid hypertonic. This may be further aggravated by several, not uncommon, practices:

(1) The feeding of normal formula in the face of on-going diarrhoea.

(2) The use of boiled skim milk to treat diarrhoea. Boiling reduces the water content, and therefore increases the solute load presented to the infant. This increases the tonicity of the extracellular fluid, and also induces increased renal water loss.

(3) The practices of adding salt to sugar-water solutions used to treat diarrhoea – this is never necessary.

(4) Occasionally, incorrect mixing of formula contributes to this situation.

(5) The loss of relatively pure water also occurs via sweating and via the respiratory tract. Situations which increase loss by either of these means, aggravate hypertonic dehydration. Thus, a hot, dry environment (such as occurs in artifically heated dwelling) combined with fever and tachypnoea (such as occurs in viral upper respiratory infection) may contribute to this condition.

Since the extracellular fluid is rendered hypertonic, it exerts an osmotic effect on the intracellular fluid, and a net shift of water from intracellular to extracellular fluid compartments occurs. The intracellular fluid compartment is considerably larger than the extracellular one and is thus easily able to maintain the extracellular volume (including the intracellular volume). Thus the signs and symptoms of dehydration do not occur as early as they normally would. At the same time, the intracellular volume is contracted, and as the process proceeds, the volume of vital organs, most notably the brain, diminishes.

The same four variables will be discussed for this form of dehydration as for the others:-

1. Volume deficit

(a) *Clinical:* The features of dehydration are the same as for any other form of dehydration. However, the hypertonic child who is 5%-10% dehydrated will not manifest the signs and symptoms of dehydration. It is only when volume depletion in excess of 10% has occurred, that the first signs of dehydration ensue. The child will usually continue to pass urine until dehydration exceeds 15%, and it is only when this degree of dehydration has occured that the signs of peripheral circulatory collapse appear.

(b) *Laboratory Aids:* The laboratory tests used are the same as for other forms of dehydration, but, as for the clinical signs, changes occur later. Thus a raised BUN or haematocrit betokens profound dehydration.

2. Electrolyte Alteration

(a) *Clinical:* The only characteristic sign of hypernatremic dehydration is a peculiar dough-like consistency of the skin. Instead of tenting or lifting easily, the skin feels rubbery and resistent to compression. The child may also show profound alteration in its state of consciousness, and manifest a bizarre restlessness.

(b) *Laboratory Aids:* Hypernatremic dehydration is said to be present when the serum sodium exceeds 150 meq/L.

3. Acid-base Disturbance

(a) *Clinical:* The features of acidosis are as outlined for the other forms of dehydration. They are almost always in evidence at the time the child presents.

(b) *Laboratory Aids:* Blood gases show characteristic metabolic acidosis with low pH, high pCO_2 and large base deficit.

4. Associated Metabolic Alterations

The vast majority of cases of hypernatremic dehydration have associated metabolic abnormalities.

Hyperglycemia is inevitably present. This cannot be diagnosed clinically, but is indicated in laboratory tests. While the presence of a high blood sugar increases the tonicity of the extracellular fluid it is a relatively minor contributor to the hypertonicity. Values do not usually exceed 500 mgm%, and insulin should NOT be given.

Hypocalcemia is a frequent finding, both at the time of initial presentation and during replacement therapy.

Guidelines for Therapy

(1) These patients should all be transferred to paediatric institutions.

(2) Because symptoms occur so late, shock is a dire, life threatening emergency. Prompt resuscitation with plasma or normal saline in quantities beginning at 20 ml/Kg, given rapidly and repeated as frequently as required to produce a reasonable blood pressure, is mandatory.

(3) Almost all of these infants will be substantially acidotic. 7.5% Sodium bicarbonate 1 meq/Kg by I.V. push and 1 meq/Kg in the pedatrol should be given. No significant rise in tonicity will be caused by this, and life-threatening acidosis is avoided.

(4) The greatest risk to these infants is that rapid reduction in tonicity of the extracellular fluid results in an abrupt shift of fluid into the intracellular compartment, most especially the brain cells. This causes intra-cerebral bleeding and seizures. The water and electrolyte deficit in these infants is replaced over a 48 hour period, allowing gradual equilibration of the fluid compartments. For practical purposes once initial resuscitation is achieved it is necessary to hang a solution of Travenol or of 3.3% Dextrose in 0.3% saline (2/3 / 1/3) at a rate of 6 ml/Kg/hour, irrespective of the child's weight. This rough figure takes into account the 48 hour maintenance fluid requirement, plus the replacement volume for the fluid deficit. The infant should be transferred to a paediatric centre with this solution running at the above rate.

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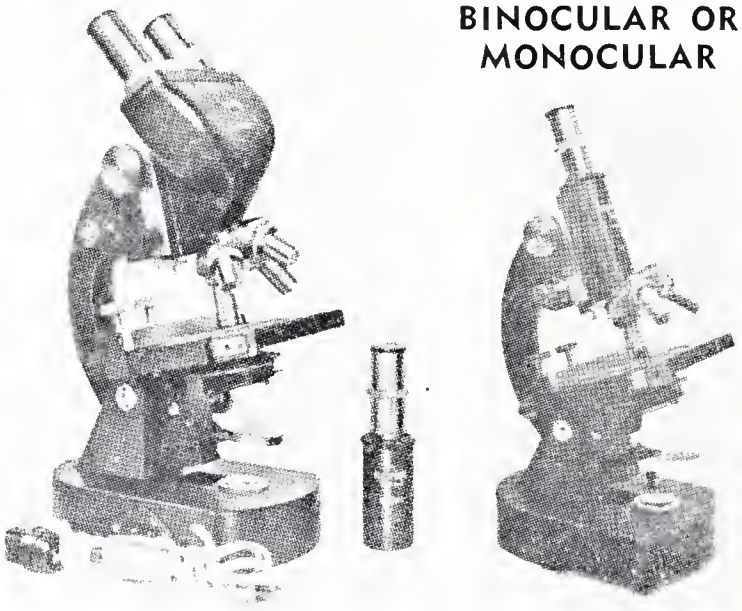

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Psychiatric Emergencies: The Crisis Intervention Approach

*George Voineskos, M.D.**

THE PSYCHIATRIC EMERGENCY

Definition

It seems rather difficult to arrive at a clear, short definition of a psychiatric emergency. An early and practical definition is given by Dr. Ab. Miller, of Toronto[1] "Any individual who develops a sudden or rapid disorganization in his capacity to control his behaviour or to carry out his usual personal, vocational and social activities." The authors of the report of the Joint Information Service of the A.P.A. and the N.A.M.H. "The Psychiatric Emergency: A Study of Patterns of Service"[2] accepted the following succinct definition[3] "All patients whose condition warrants prompt psychiatric attention for whatever reason." However, of 154 facilities providing a psychiatric emergency service, which the authors surveyed, only 20 said they had formal definitions of what constituted a psychiatric emergency; and "none of these would meet dictionary standards"[1]. Among the handful which appeared to have been carefully thought through was "An emergency is any urgent psychiatric condition, functional or organic, for which immediate treatment would increase or contribute to the patient's likelihood of recovery or provide urgently needed protection." This definition includes a hint of the preventative opportunities offered by early intervention in psychiatric emergencies.

A definition in keeping with current practice is "any situation which compels a person to seek immediate psychiatric treatment, or which impels his family, friends, or an official agency to seek such treatment for him"[4].

Incidence

As many as 50 per cent of patients attending general hospital emergency clinics have been found to suffer from some form of psychiatric condition, either relating to the presenting somatic complaint or independent of it[5, 6]. Figures for primary psychiatric cases in emergency departments of general hospitals vary. Watson[7] reported 2.5 per cent of total patients in an emergency department were psychiatric cases, Errera et al[8] found 2.7 per cent, and Whitely and Denison[9] reported an incidence of 6.6 per cent. Silbert[10], however, found approximately a 30 per cent incidence, while Nigro[6] reported that 23 per cent of those seen in an emergency room of a general hospital between 10:00 p.m. and 8:00 a.m. on 45 separate occasions, had come primarily because of psychological problems. The variation in the incidence of psychiatric emergencies in these studies probably reflects the lack of generally acceptable definitions and criteria for psychological problems and the diverse backgrounds and training of the observers, possibly demographic differences and certainly differences in the organization and patterns of health care delivery.

Some Characteristics of Psychiatric Emergencies

Emergency departments usually serve a younger population than does the remainder of the hospital; fifty per cent of psychiatric emergency consultants are provided for patients aged 20-39 years, those aged 20-29 years forming the largest single group[11, 12]. More females are found among psychiatric emergencies in general hospital emergency departments, the female to male ratio being at least 3:2[11, 13, 14]. A slightly older population, however, and a male preponderance among the psychiatric emergencies was found in the emergency room of a general hospital in London, England[9]. More single, separated, widowed and divorced people than married are to be found among the psychiatric emergencies[11, 14]. About a quarter of the patients are unemployed, almost as many as fully employed, and more than twice the number of those attending a regular psychiatric out-patient clinic[11, 14].

At least two thirds of psychiatric emergencies had a previous psychiatric contact [11, 13, 15]. Miller[14] reports that 52 per cent of the patients had an on-going significant treatment relationship at the time of their presentation as a psychiatric emergency; specifically, 37 per cent were involved in current psychiatric treatment and 15 per cent in non-psychiatric, medical treatment.

Crisis Situations and Psychiatric Emergency Referrals

The emphasis of the definitions of psychiatric emergency is placed on the behavioural and situational aspects and does not implicate any particular category of psychiatric illness[1, 2]. This emphasis is reasonable for two reasons. First, emergencies are not limited to particular categories of psychiatric illness but develop in those with psychosis, neurosis, brain syndromes, personality disorders and psychosomatic disturbances[1, 2], and also in ordinary, normal people. Second, it is generally the threat of assault, damage, or suicide that causes alarm leading to public intervention and the recognition of an emergency[2, 16]. This suggests that most psychiatric emergencies are social emergencies, although of course, the converse is not, necessarily, true[16].

Since most emergencies come to or are brought to treatment facilities as a result of external evidences of disturbance, that is, on the basis of their behaviour, it is possible in many emergencies to identify certain

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crucial events or experiences that appear to have triggered the emergent behaviour[2]. In almost two-thirds of psychiatric emergencies social factors were felt to be primary[16], family conflicts, including marital discord, impending divorce, desertion and conflicts with parents, accounting for half of the referrals. Crises relating to job, income and financial difficulties also occupy a prominent position, with bereavement making a contribution as well.

Glasscote et al[2] suggest that it seems beside the point whether one takes the position that emotional disturbance has its origin in intrapsychic processes, in environmental stress, or in an interplay of the two. Morrice[16] states that the dichotomy between social and psychiatric factors is false and puts an unwarranted interpretation upon the facts. The two categories are often so closely interdependent that to separate them is to do injury to the total concept of psychiatric illness; however, it is probably necessary to emphasize social forces at the expense of individual psychopathology, in order to reorientate ourselves to deal more effectively with the legitimate mental health needs of our society. This is particularly important in cases of psychiatric emergencies. The patient in crisis may respond more readily to a social prescription that involves changes in the family as well as in the patient himself[16].

It is important to consider the patient and the social environment playing a role together in making a psychiatric emergency. In order to facilitate this point of view, a concept has been introduced called "the ecological group"[14] which refers to "the patient and those people in the social environment with whom he has major dynamic relationships. It may include people in the family environment, the work environment, or the medical environment. In short, it cuts across various social systems, to include all those people who currently provide important sources of gratification and control for the patient and for whom he does the same." The crisis arises in the ecological group, with the resulting emergency being more that of an unstable social system than that of an unstable person.

Channels of Referral

Glasscote *et al*[2] report that General Practitioners, relatives and friends, and self-referrals account for about equal percentages, and among them for three-fifths of all referrals; the police account for about 10 per cent. At Rochester, N.Y. almost half the patients were referred by self and family[17]. In Montreal approximately half the patients came accompanied by family and friends, thirty-nine per cent unaccompanied, and the remainder were brought by police or professionals[11]. At Queen Street Mental Health Centre, Toronto, half the patients are self and/or family referred; police referrals account for 20 per cent of the total[18].

Hours of Referral

The majority of emergencies occur during daytime and evening, with relatively few late at night[2]. In a careful service monitoring which occured at Hamilton[19], 80 per cent of the patients using the crisis facility came between eight in the morning and ten at night, which is in line with studies reported from other centres[20]. At Queen Street Mental Health Centre, Toronto, about half the emergencies occur during the regular working hours of the week.

Prevalence of Diagnostic Categories and Presenting Behaviour

Psychiatric emergencies are not confined to any particular diagnostic category, spanning the whole range of psychiatric disturbance. In London, Whitely and Denison[9] found approximately a quarter suffering from psychosis, just under half from neurosis and a quarter from personality disorder, including addiction. Similar figures were reported from Montreal[11], with approximately 26 per cent suffering from schizophrenia, 31 per cent from depressive neurosis, 18 per cent from neurosis other than depression and 10 per cent from drug abuse and alcoholism. The reports from Rochester[13, 17] vary somewhat with psychosis accounting for 42 per cent, neurosis for 29 per cent and character disorder for 24 per cent.

Contrary to popular belief or fear, that the mentally ill are dangerous to others, the percentage of aggressive and assaultive behaviour seen among psychiatric emergencies is small. Glasscote *et al*[2] concluded that, in relation to the behaviour of emergency patients, the significant points seem to be a) the high frequency of depression b) that the combined number of emergencies presenting as depressed or anxious is three and a half times as great as the number who are assaultive, aggressive, or destructive and c) the high frequency of intoxication. The evidence indicates that the patient who is dangerous to himself is much more common than the patient who is dangerous to others. Miller[14] reported suicidal behaviour in 30 per cent of the patients, those who had made a suicidal attempt accounting for 13 per cent, whereas only one per cent were judged as homocidal. Lowy[11] found suicidal behaviour in approximately 15 per cent and aggressive or hyperactive behaviour in 10 per cent. Watson[7] reported that 50 per cent of the psychiatric emergencies arriving in a general hospital emergency department were cases of attempted suicide.

The Disposition

There is good agreement that at least 8 out of 10 psychiatric emergencies who are seen by emergency services, either in the general or mental hospital, are referred for further treatment, psychiatric or medical. The number of those referred for immediate psychiatric admission has varied and is usually in inverse proportion to those referred for outpatient care.

Johnson reports[21] that 46 per cent of psychiatric emergencies seen in the Oldham and District area, England, required immediate psychiatric admission.

This is in keeping with figures reported from Rochester[13, 17] and from Queen Street Mental Health Centre, Toronto[20, 22]. The percentage reported from London, Montreal and Palo-Alto is smaller (26 per cent, 15 per cent and 17 per cent respectively[9, 11, 11]). Up to sixty per cent of the patients are referred for psychiatric outpatient treatment[11].

It should be emphasized that various studies have shown that initial diagnoses have little relation to the disposition of emergencies. Behavioural management often takes precedence over diagnostic issues in dealing with emergencies[23]. Baxter *et al*[24] found that those patients having greater difficulty in communicating were significantly more frequently considered to be more dangerous to themselves and/or others. The importance of this factor for emergency services in a city like Toronto which has a large number of first generation immigrants with linguistic problems cannot be overemphasized. Many non-medical factors such as availability of beds, the attitudes of relatives and neighbours, of police officers and of emergency room staff are major determinants of admissions[15, 25].

THE PSYCHIATRIC EMERGENCY SERVICE

The Need

The fact that even those who have a personal physician tend to bypass his professional services and go directly to the local emergency room[8, 14, 26, 27, 28], and the fact that about half of the cases seen in emergency rooms since 1945 have not been considered to be true emergencies[29], though the greatest majority do indeed have psychiatric problems[16], makes it reasonable to speculate that the average patient is seeking an immediately available service for the treatment of his ills and problems[30]. In the opinion of much of the public, the emergency room and its staff have apparently become the primary deliverers of health and social services. Inevitably there has been a dramatic increase in the public's use of emergency room facilities in the last ten years, particularly for psychiatric problems.

A variety of services has been developed to cope with the increased demands, notably 24 hour emergency psychiatric consultation which is now available in the hospital emergency rooms of most Canadian and American cities. Emergency consultation already constitutes a major portal of entry of patients to psychiatric treatment services, both inpatient and outpatient.

For many patients, their visit to the emergency clinic at a time of personal or social crisis provides their first contact with a psychiatrist, an experience which considerably influences their subsequent attitude towards psychiatry and psychiatric treatment. For the hospital, clinical and administrative decisions made at the time of the emergency consultation may have far reaching consequences; internally, in terms of the use of bed space and equipment, allocation of professional and non-professional staff time etc., and externally, in terms of the hospital's relationship with the community and the other agencies serving its medical, rehabilitative and social needs[11]. It therefore follows that an effective emergency psychiatric service providing immediate help to the patient, family and community must be a high priority for any community care scheme. There are other reasons for this as well. As Johnson[21] points out, when the tolerance of a family is tried to its limits by having to cope with prolonged abnormal behaviour in a crisis without help, there develops increasing rejection of the patient and resistance to help further when the patient recovers and is fit for discharge from hospital. The increasing use of community care services for the mentally ill and the evolution of the revolving door practice of admission and readmission also means that there will be an increasing demand for emergency services in the community. However, of all the reasons the most important and challenging, for some, is the opportunity existing in a psychiatric emergency service for preventive work and restoration of the patient to a higher level of functioning and for prevention of unnecessary admissions or for shortening the length of the patient's hospital stay by utilizing crisis intervention techniques.

Modus operandi

Three areas require careful attention in the organization of an emergency psychiatric service.

a) Monitoring of hours and days of demand, and a reassignment of personal appropriately. Following the monitoring of the demand in Hamilton[19] the staffing pattern was rearranged accordingly. Studies of this kind and flexibility of the institution and its staff to act on the results of such studies are required.

b) The practice of one psychiatric Resident and/or staff psychiatrist covering the emergency service of a general or mental hospital after 5:00 p.m. and on the weekends will have to be changed. The repertoire of responses available to such a psychiatrist regarding the disposition of psychiatric emergencies is very limited, most often it is confined to the decision to admit or not to admit, and at times to prescribe or not. When, in the middle of the night, in the emergency room of the hospital, in a city which could have 3 inches of snow overnight, an unemployed, penniless and without accommodation fellow appears, who not unnaturally, would feel unhappy, dejected and even suicidal, the duty psychiatric's dilemma of disposition will probably be resolved by admitting such a fellow. Mountney *et al*[15] point out that so far as emergency action was concerned, many patients needed only a bed for the night. The limited repertoire of the duty psychiatrist is further restricted by the fact that most social agencies do not operate after 5:00 p.m. and on the weekends. To implement the multidimensional strategies which are essential in a psychiatric emergency service it is sug-

gested that a multidisciplinary team or medico-psychosocial team[22, 30, 31] is required. Such a team, consisting of staff of different disciplines[22, 31] or, at least, of a psychiatrist, a social worker and a nurse[30] is the fundamental working unit of a psychiatric emergency service, particularly of a crisis intervention oriented service. The members of this team can complement one another's talents and professional skills. The ability for at least one member of the team to be mobile and e.g. visit the family, if need be, or, similarly, make arrangements for a patient to be accommodated for the night in a hostel and even take the patient there, would prevent many unnecessary admissions to a psychiatric ward.

c) In psychiatric emergency services the emphasis has shifted from mere disposition to case finding, brief treatment and preventive work. Crisis intervention theory provides a framework within which such emergency services can function[32]. A number of reports have appeared describing the operation of psychiatric emergency services along crisis intervention lines[22, 30, 31, 32, 33, 34].

Crisis Theory

Crisis Theory as originated by Lindemann[35] and developed by Caplan[36, 37] accepts that people usually deal adequately with problem situations by using habitual responses in order to maintain equilibrium. Crisis occurs when there is an imbalance between the difficulty and importance of the problem and the resources available to deal with it. A hazardous situation i.e. a crisis, then, develops which presents a threat to the individual. The term "crisis" generally indicates a disruption of adaptation, in which the usual problem-solving techniques do not work. This acute upset presents an opportunity for growth, when the crisis can be mastered, but in the susceptible individual it may precipitate regression and the onset of acute psychiatric illness[38]. The crisis emerges as an acute, unexpected upheaval in a previously steady and stable equilibrium of a personal and/or social system. The intensity and unexpectedness of upset faces the person or the social system with the seemingly impossible task of coping with stress, putting the day to day resources for problem-solving before a sheer impossible task. Psychologically a state of helplessness, coupled with anxiety, fear, and panic may be the result. The individual in the crisis situation is vulnerable. This vulnerability makes the help of significant or professional persons practically always necessary. Such is termed "crisis intervention".

Crisis intervention therefore can be defined as any type of professional and non-professional aid in acute psychological upset[38]. If such help is successful, then the individual masters the crisis situation. This results in a higher mental health level of functioning. The problem-solving capacity of the individual has been increased.

Far from being a nuisance, crisis is regarded as a positive force providing leverage for change. Crisis is viewed as a catalyst that disturbs old habits, evokes new responses, and becomes a major force in charting new developments[39]. Caplan emphasizes the motivational force of crisis and the dynamics for change that exist in the open state of the organism in crisis. When customary defences fail, the powerlessness of the individual pushes him to the brink, where he may be ready for other options and for the development of new coping devices. Caplan's analogy of the individual in crisis to a person standing on one leg, when a gentle push may cause him to put his foot down and move in a new direction, is a useful one. Here, in contrast to the non-crisis state when an individual has both feet firmly planted and immobilized, a maximum of change can be accomplished with a minimum of effort. The point at which the new crisis theory departs most drastically from the older view is in the new relationship of crisis events to earlier unresolved conflicts and in the second chance provided the individual to deal with these through new tactics. Old problems, linked symbolically to the present, emerge into full consciousness; energy, previously used to sustain repression and denial, becomes available for resolution of new and old issues. The readiness of the individual in crisis to reach out to others for help and the helping responses his distress evokes in others are two other positive forces for change[40].

Crisis Intervention in the Psychiatric Emergency Service

The crisis is short. Caplan has identified six weeks as the length of the crisis period. In crisis therapy, therefore, brevity is essential. The here and now urgency of crisis is the limit which orders and directs all therapeutic activities. All aspects of treatment such as assessment, intervention and termination must take place within a limited time.

The first objective of the initial interview is to gather information as a base in defining the problem or problems, identifying the desired outcomes and suggesting means of achieving them. The information relevant to the client's present state must be obtained. Family members and significant others are interviewed and involved as rapidly as possible. Mobilization and linkage with community agencies is instituted from the point of assessment. Such tactics as a home visit, or contact with an appropriate community agency often assist in the resolution of the crisis. The individual is seen within his social orbit or ecological group[14, 21, 41]. The skills required in crisis intervention are not new but they must be reordered to focus more intensively than in treatment methods not limited by time. One area of new knowledge required is the awareness of specific programs and services available within the community. Staff must learn to explore and utilize alternatives to hospitalization.

In outpatient followup, when it is arranged, crisis therapy techniques are utilized. Treatment contracts are time limited. This is important for the patient and his family and not infrequently for the staff. The patient develops the idea that he has only a limited time in which to resolve his difficulties. At the same time, the patient's family and friends do not begin to identify him as a hopeless psychiatric casualty. Focus is on the current life situation and help in coping with current problems. An attempt is made to develop a more positive relationship with the patient and to restore his self-esteem and self-reliance. The relationship between the therapist and the patient is quite different to that seen in more traditional settings or psychotherapies. Patient and therapist often collaborate in deciding the need for and nature of followup treatment, including in some instances the need for or continuance of hospitalization[31]. Psychotropic agents are freely employed for symptomatic relief. Medication is liberally used for alleviating ego-alien symptoms and facilitating rapid return to premorbid levels of functioning. Being able to maintain role performance, and to obtain the needed sleep and anxiety-reduction to effect this, is seen as an integral part of brief treatment.

It is essential that a small psychiatric inpatient unit or at least a backup emergency ward should be an integral part of the psychiatric emergency services[9, 21, 30]. The psychiatric staff responsible for the emergency services should also have direct responsibility for the ward[21, 22].

On the backup emergency ward crisis therapy techniques are employed. Admission to such a unit is presented not as a cure but as a step in treatment. On entry, discharge is planned. Brief therapy techniques are utilized, the emphasis being on the resolution of recent problems that have overwhelmed the patient, with the goal of helping him to evolve adequate, adaptive strengths with which he can again cope with his problems[22, 42]. The utilization of crisis intervention concepts in brief stay inpatient settings helps to avoid an individual being pushed further into the role of being a patient, by institutional and social factors which often seem to operate within mental hospital systems, psychiatric units and even among many better staffed psychiatric facilities where depth psychotherapy is the primary treatment modality[34].

The crisis intervention model for brief inpatient hospitalization provides a viable and most promising alternative to longer term hospitalization for many psychiatric emergencies and acutely disturbed psychiatric patients[22, 31, 32, 34, 43]. The time limited stay in such settings engenders intensive co-ordination of basic elements of an inpatient assessment. For instance, laboratory investigations and reports which ordinarily could take some time to have available, are done within a time limit. The time limit also transmits the staff's expectation that the patient will be able to function and leave hospital[22] within a few days. Crisis therapy techniques, in brief stay inpatient units for psychiatric emergencies, have been utilized increasingly in the last decade and have therapeutic and cost reducing merits.

The Crisis intervention approach in the management of psychiatric emergencies has many advantages over more traditional treatment approaches, both for the patient and the hospital.

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Cont. on inside Back Cover

Acute Drug Poisoning

C. D. Tamblyn, M.D.

Poisoning by drugs and other chemicals has reached epidemic proportions[1, 2]. The number of patients presenting to Emergency Departments following drug overdose has been increasing by 10% per year[1]. Accidental and deliberate poisonings account for over 10,000 deaths annually in the United States. These figures attest to the fact that acute drug poisoning is one of the commonest medical emergencies. An average of one case per day is not unusual in many Emergency Rooms.

PATTERN OF DRUG POISONING

Accidental poisoning in childhood remains a major problem but the recent increase in total incidence comes from adults who ingest prescription drugs as a suicidal gesture or attempt, and from young people who experiment with, or abuse drugs.

The type of drug taken by a patient generally reflects the drug's use and hence availability in the community. The decrease in incidence of barbiturates and salicylates as putative drugs is well illustrated in Ruedy's recent review of last year's experience at the Montreal General Hospital (Table I)[4]. It is also interesting to note from this review that of the 108 patients admitted, nearly 50% had been under psychiatric care in the recent or remote past. Nearly 50% had experienced a previous drug overdose and nearly 50% had ingested more than 1 drug.

TABLE I

Number of Patients Treated for Acute Poisoning at the Montreal General Hospital in 1972.*

	Patients Admitted	Patients Seen
Benzodiazepines	35	119
Non-barbiturate hypnotics	33	80
Street drugs	11	69
Miscellaneous drugs and substances	21	63
Phenothiazines	22	49
Barbiturates	21	49
Salicylates	12	38
Tricyclic antidepressants	23	31

* *Adapted from Ruedy*[4].

TREATMENT

The treatment of the poisoned patient provides the chance to completely reverse a moribund state (a relatively uncommon opportunity in medicine). The temptation to classify treatment of these patients into Curative, Palliative or Punitive is strong. However, Koch-Weser's rational and orderly approach is perhaps more instructive and is summarized in Table II.

The urgency of the situation will dictate the approach to the patient. Certainly supportive treatment of compromised respiratory and circulatory function must take precedence as in any other seriously ill patient.

In general, one first attempts to identify the poison and define the patient's state of altered pathophysiology. Blood is sent for electrolytes, BUN, glucose, blood gases and toxicology. Urine and gastric contents are examined and sent for toxicology.

TABLE II

TREATMENT OF ACUTE CHEMICAL POISONING

I. Prevention of Further Absorption of Poison.
   1. Emptying the stomach.
      a. Gastric Lavage.
      b. Induction of vomiting.
   2. Minimizing gastrointestinal absorption.
      a. Adsorption (charcoal).
      b. Neutralization and precipitation.
      c. Catharsis.

II. Supportive Therapy.

III. Administration of Systemic Antidotes.
   1. Pharmacologic antagonists.
   2. Chemical agents.

IV. Removal of Absorbed Poison from Body.
   1. Urinary Excretion.
      a. Osmotic diuresis.
      b. Alteration of urinary pH.
   2. Dialysis.
      a. Peritoneal dialysis.
      b. Haemodialysis.
   3. Exchange Transfusion.
   4. Chelation and Chemical Binding.
   5. Biliary Excretion – interruption of enterohepatic circulation.
   6. Detoxification-enzyme induction?

(Modified from Koch-Weser)[3]

Emptying the Stomach

With the exception of corrosives (lye, drano, acids, etc.) and petroleum hydrocarbons (gasoline, kerosene, furniture polish) the stomach should be emptied immediately by lavage or induced emesis. Despite some controversy over the matter, gastric lavage is generally preferable[4, 5, 6]. When done properly it is quick, safe, and as efficient as emesis, and most importantly, it can be used in obtunded patients (after endotracheal intubation). It also allows the instillation of activated charcoal down the tube prior to its removal.

Activated Charcoal

The ability of activated charcoal to irreversibly adsorb an impressive array of drugs and poisons has long been known[7, 8]. These are listed in Table III.

TABLE III

SOME OF THE DRUGS AND POISONS EFFECTIVELY BOUND BY ACTIVATED CHARCOAL

Alcohol	Kerosene
Arsenic	Lead
Atropine	Mercury
Barbiturates	Nicotine
Chloroquin	Opiates
Chlorpheniramine	Parathion
Chlorpromazine	Phenol
Cocaine	Propoxyphene (Darvon)
Digitalis	Quinine
Ethchlorvynol (Placidyl)	Salicylates
Glutethimide (Doriden)	Strychnine
Iodine	Sulfas
Ipecac	Tricyclic Antidepressants

Despite this knowledge, its use in the routine treatment of poisoned patients has been sporadic. However, there has been a recent resurgence of interest in its use[9, 10].

Ruedy reports in his series that 74% of the patients admitted to the Montreal General Hospital with acute poisoning were given 100 gm of activated charcoal down the gastic lavage tube after lavage[4]. The average duration of coma in these patients (12 hours) was significantly shorter than that of other reported series and the author attributed this in part to the effect of the charcoal. This is the first reported series to mention its routine use.

Though more studies to document its clinical effect are needed, there would appear to be sufficient evidence to advocate the routine instillation of 100 gm of activated charcoal following gastric lavage.

Antidotes, Enhanced Excretion and Supportive Therapy

Most chemical poisonings are reversible and self-limited disease states. Skillful supportive therapy can keep most seriously poisoned patients alive and their detoxifying and excreting mechanisms functioning until the amount of poison in the body has fallen to safe levels. There are a few toxic substances for which an antidote exists and the physician would be well advised to check for these in one of the standard texts, while the lavage and charcoal are being prepared[11, 12, 13]. However most poisons lack specific antidotes, making successful therapy largely dependent on the physician's ability to provide expert supportive care.

Embarking upon therapy to enhance excretion appeals to many physicians. However, forced diuresis, dialysis, exchange transfusion and chelation are complicated modes of therapy which carry their own risks and toxicity, particularly in the seriously ill patient with compromised cardiac, respiratory, and renal function.

In general one is best advised not to give a poisoned patient yet another drug, and not to challenge a compromised patient with large volumes of fluids.

The majority of the drugs taken as overdoses are highly tissue bound, metabolized by the liver, and not dializable to any significant degree. These include the benzodiazepines, the non-barbiturate hypnotics, the phenothiazines, the tricyclic antidepressants and some of the street drugs. In these patients forced diuresis or dialysis rarely does more than demonstrate how much the patient can tolerate.

Forced alkaline diuresis will enhance renal clearance of barbiturates and salicylates and has a place in the treatment of some of these patients.

Though dialysis does speed the removal of many drugs, its only absolute indication would be in patients who have ingested methanol or ethylene glycol. The metabolites of these poisons (formaldehyde and formic acid) are more toxic than the parent compounds. Therefore, if the patient is treated expectantly, these metabolites accumulate and the patient will deteriorate. The other place for dialysis is in the patient with renal failure (cf. any patient in renal failure) and in the patient who has absorbed *very* large amounts of a dializable substance with a high intrinsic toxicity (e.g. salicylate).

Supportive therapy is best given in an intensive care setting where vital signs can be constantly monitored. The complications which should be looked for include the following: respiratory depression and hypoxia, hypotension, cerebral edema, pulmonary edema, acid-base disturbances, fluid and electrolyte imbalance, hypothermia, arrhythmias, convulsions, and renal and hepatic failure. The treatment of these in the poisoned patient is almost always the same as in any other medical patient.

To summarize, treat the patient – then his poison.

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GRAND ROUND QUIZ — Emergency Medicine

*Ian Feferman, M.D.**

QUESTIONS

One or more answers may be correct.

1. *A 24 year old male presents in the Emergency Room with a 3 hour history of sharp right-sided chest pain. He states that he is having some difficulty breathing especially while walking up stairs. Physical examination is unremarkable except for decreased breath sounds on the right side.*
   The most likely diagnosis is:
   a) Asthma
   b) Pulmonary embolus
   c) Pneumothorax
   d) Bornholm's disease
   e) Angina pectoris

2. *All of the following diagnoses are included in the differential diagnosis of 'the red eye' except:*
   a) Conjunctivitis
   b) Foreign body
   c) Iridocyclitis
   d) Retinal detachment
   e) Acute glaucoma

3. *Which of the following drugs should not be given to an Asthmatic in severe bronchospasm:*
   a) Adrenalin
   b) Antibiotics
   c) Steroids
   d) Valium
   e) Aminophylline

4. *A 34 year old female comes in because of "a fast heart". The ECG is typical of paroxysmal atrial tachycardia (PAT). The rhythm persists despite carotid and occular massage and the Valsalva manoeuver.*
   The drug of choice would be:
   a) Tensilon
   b) Valium
   c) Digoxin
   d) Quinidine
   e) Atropine

5. *You are having supper in your favourite restaurant when an elderly gentleman at the next table suddenly becomes speechless and unable to take a breath, clutches at his chest and collapses on the table.*
   The most likely diagnosis is:
   a) Cardiac arrest
   b) Cerebral vascular accident
   c) Subarachnoid hemorrhage
   d) Food asphyxiation
   e) Hysterical conversion reaction

6. *A 6 year old child has ingested half a bottle of floor-cleaning solvent. He is alert and fully conscious when he arrives in the Emergency Department.*
   Which of the following should not be done;
   a) Induce vomiting
   b) Gastric lavage
   c) Infusion of IV fluids
   d) Chest X-ray
   e) 100 gm. charcoal crystals via D tube

7. *A severely burned patient is most likely to become infected with which of the following organisms during the five days immediately following the burn:*
   a) Proteus
   b) Streptococcus
   c) Klebsiella
   d) Pseudomonas
   e) E. Coli

8. *A 47 year old female is brought to the Emergency Department in coma. The neighbor who brought her in says she might be diabetic.*
   Your first course of treatment should be:
   a) Insulin 50 units IV stat.
   b) Solu-cortef 100 mg. IV stat.
   c) Morphine 5 mg. IV.
   d) Dilantin 100 mg. p.o.
   e) 50 ml. of 50% glucose IV.

9. *A 21 year old female, P0 G1, presents in Emergency complaining of sharp right lower quadrant pain and some bleeding per vaginum. Just as she finishes telling you that she is 12 weeks pregnant, she collapses in front of you.*
   The most likely diagnosis is:
   a) Threatened abortion
   b) Twisted ovarian cyst
   c) Ruptured ectopic pregnancy
   d) Incompetent cervix
   e) Pulmonary embolus

10. *Which of the following measures should not be implemented for an inversion injury of the ankle:*
    a) Elevation of the limb for 24 hours
    b) Crutches
    c) Cold compresses after 24 hours
    d) Strap ankle in a position of flexion and eversion.
    e) Strap ankle in a position of extension and inversion.

11. *A patient is brought to the Emergency Room after being involved in a car accident. He is complaining of pain in the neck as well as numbness and tingling in the fingers and toes.*
    Which of the following should not be done:
    a) Roll the patient carefully onto a hospital stretcher
    b) IV Valium to relieve muscle spasm
    c) X-Ray lateral cervical spine
    d) Skull X-rays
    e) Check for meningeal irritation by flexing the neck

* *Resident, Mount Sinai Hospital, Toronto, Ontario*

GRAND ROUND QUIZ — Answers

1. - c)
This story is typical of a pneumothorax. A chest X-ray will furnish the diagnosis. The treatment is to insert a chest tube attached to an underwater seal which will allow the lung to re-expand.

2. - d)
Retinal detachment usually presents as a disturbance of vision. There may be associated pain but the eye is not red.

3. - d)
While Valium has an excellent sedative effect it also results in respiratory depression which is of concern in this case.

4. - a)
Tensilon is a quick acting parasympathomimetic drug. The enhancement of the vagal stimulus to the heart is often strong enough to convert the PAT. Furthermore it has only a short duration of action.

5. - d)
For an excellent reference to the problem of food asphyxiation please refer to: New Eng. J. of Med. *259*, #2, 81, 1973.

6. - a)
Providing the patient is alert and conscious it is safe to pass a D-tube and lavage the stomach. The induction of vomiting is contraindicated when tissue-damaging solutions, such as solvents, have been ingested since the esophagus may be severely damaged by the regurgitation.

7. - b)
Streptococcus is the commonest infecting pathogen for the first five days following a burn. After this time Psuedomonas infections commonly occur.

8. - e)
Insulin is absolutely the wrong medication to give any comatose patient unless the blood sugar is found to be very high. If the patient is questionably diabetic then hypoglycemic coma must also be considered. The injection of glucose does no harm and response in a hypoglycemic patient is often dramatic.

9. - c)
This history is typical of a ruptured ectopic pregnancy. These patients can rapidly become hypotensive and go into shock and therefore represent an acute obstetrical emergency.

10. - c) and e)
The object of strapping an ankle with an inversion injury is to put the lateral ligaments at rest. This is best accomplished with a position of flexion and eversion. Cold compresses should be applied to the ankle only during the first 24 hours to prevent swelling.

11. - a), b) and e)
Prior to manipulating the neck or moving the patient from the ambulance stretcher you must be sure there is no fracture or dislocation of the cervical vertebrae. This is best assessed by a carefull neurological examination and a lateral X-ray of the cervical spine, making sure that you see all the cervical vertebrae. As well any patient suspected of head trauma or CNS injury should not be given sedating drugs.

Continued from page 89

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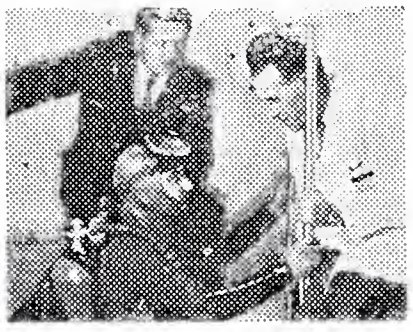

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